

WHAT IS CLAIMED IS:

1. A cell co-culture system comprising a cell culture container partitioned into two or more compartments by one or more removable partition units, wherein the bottom edge of said removable partition unit(s) is in contact with the cell culture surface of said cell culture container, wherein different types of cells can be cultured in each of said compartments, and cellular interaction or cell migration is to be observed in an area on said cell culture container covered by the bottom edge(s) of said removable partition unit(s) after removal of said partition unit(s).

2. The cell co-culture system of claim 1, wherein said cell culture container is selected from the group consisting of a culture dish, a multi-well culture plate, and a culture chamber slide.

3. The cell co-culture system of claim 1, wherein said cell culture container is made of a material selected from the group consisting of polystyrene, glass, and plastic with high optical compatibility of glass.

4. The cell co-culture system of claim 1, wherein said cell culture container is treated or coated with biomembranes or biomolecules for the culture of specific cell type.

5. The cell co-culture system of claim 1, wherein the diameter or the diagonal dimension of said cell culture container is from about 10 mm to about 300 mm.

6. The cell co-culture system of claim 1, wherein said removable partition unit is made of a material selected from the group consisting of polystyrene, glass, medical grade silicon, metal, and biomembrane.

7. The cell co-culture system of claim 1, wherein the thickness of said removable partition unit is from about 0.01 mm to about 10 mm, wherein the width of the area covered

by the bottom surface of said removable partition unit on said cell culture container is from about 0.01mm to about 10mm.

8. The cell co-culture system of claim 1, wherein each of the two sides on the
5 bottom edge of said removable partition unit is in a shape selected from the group consisting of straight line, sawtooth-shaped and wave-shaped.

9. The cell co-culture system of claim 1, wherein the bottom edge of said
removable partition unit is attached and sealed onto the cell culture surface of said cell culture
10 container by sealing glue or pressure seal.

10. The cell co-culture system of claim 9, wherein said sealing glue or pressure
seal is biologically inert, removable and leaves no damage to the cell culture surface of said
cell culture container.

15 11. The cell co-culture system of claim 9, wherein said sealing glue or pressure
seal comprises medical grade silicone glue or rubber.

12. The cell co-culture system of claim 1, wherein said cell culture container is a
20 cell culture dish, and the opposite ends of each of said removable partition units are attached
respectively to the wall of said culture dish and to a central culturing cylinder located in the
middle of said cell culture dish, wherein the bottom edge of each of said removable partition
units is attached to the cell culture surface of said culture dish by a sealing material that is
connected to an overhang located on the exterior or interior side wall of said culture dish.

25 13. The cell co-culture system of claim 12, wherein the thickness of said
removable partition unit is from about 0.01 mm to about 10 mm, and the width of the area
covered by the bottom edge of said removable partition unit on said cell culture dish is from
about 0.01mm to about 10 mm.

14. The cell co-culture system of claim 12, wherein said sealing material is biologically inert, removable and leaves no damage to the cell culture surface of said cell culture dish.

5

15. The cell co-culture system of claim 14, wherein said sealing material comprises medical grade silicone glue or rubber.

10 16. The cell co-culture system of claim 1, wherein said removable partition unit is cylindrical in shape and encloses a circular area on said cell culture container.

17. The cell co-culture system of claim 16, wherein said circular area is further divided into two or more compartments by removable partition unit(s).

15 18. The cell co-culture system of claim 16, wherein said removable partition unit is attached to the cell culture surface of said cell culture container by direct and tight contact between optically polished surfaces of said partition unit and said cell culture container, said removable partition unit further comprises holder(s) that secure the position of said partition unit on said cell culture container.

20

19. The cell co-culture system of claim 16, wherein the thickness of said removable partition unit is from about 0.01 mm to about 10 mm, and the width of the area covered by the bottom edge of said removable partition unit on said cell culture container is from about 0.01mm to about 10mm.

25

20. The cell co-culture system of claim 1, wherein said removable partition unit is rectangular in shape and encloses a square or rectangular area on said cell culture container.

21. The cell co-culture system of claim 20, wherein said removable partition unit is attached to the cell culture surface of said cell culture container by direct and tight contact between optically polished surfaces of said partition unit and said cell culture container, said removable partition unit further comprises holder(s) that secure the position of said partition unit on said cell culture container.

22. The cell co-culture system of claim 20, wherein the thickness of said removable partition unit is from about 0.01 mm to about 10 mm, and the width of the area covered by the bottom edge of said removable partition unit on said cell culture container is from about 0.01mm to about 10mm.

23. The cell co-culture system of claim 20, wherein said square or rectangular area is further divided into two or more compartments by removable partition unit(s).

24. The cell co-culture system of claim 1, further comprising a cell sampler useful for collecting selected cells from said culture container, said cell sampler has a cutting end and a sampling end on its opposite ends, wherein said cutting end is used to mark a target region on the cultured cell layer, and said sampling end comprises a removable cell sampling surface to collect said selected cells.

25. The cell co-culture system of claim 24, wherein said cell sampling surface is a polycarbonate membrane or poly-lysine treated microscopic slide cover slip.

26. The cell co-culture system of claim 24, wherein said sampling end has a diameter or diagonal dimension from about 5mm to about 50mm.

27. The cell co-culture system of claim 24, wherein said cutting end and sampling end are in a shape selected from the group consisting of square, rectangle and circle.

28. A method of studying cell-cell interaction or interaction between a cell and a solid biologic material, said method comprises the steps of:

culturing different types of cells or solid biological material in the different compartments of the cell culture container of claim 1, wherein cells grow on the solid surface of said cell culture container partitioned by removable partition unit(s);
removing said removable partition unit(s) from said cell culture container; and
examining cell-cell interaction or interaction between a cell type and a solid biological material in the area covered previously by the bottom edge of said removable partition unit(s).

29. The method of claim 28, further comprises the steps of:

contacting a selected region on said cell culture container with the cutting end of a cell sampler, said cell sampler has a cutting end and a sampling end on its opposite ends;
collecting cells in said selected region with said sampling end of said cell sampler, wherein said sampling end comprise a removable cell sampling surface to which said cells in said selected region will adhere.

30. A method of studying cell-cell interaction or interaction between a cell and a solid biologic material, said method comprises the steps of:

culturing different types of cells or solid biological material in the different compartments of the cell culture container of claim 12, wherein cells grow on the solid surface of said cell culture container partitioned by removable partition unit(s);
removing said removable partition unit(s) from said cell culture container; and
examining cell-cell interaction or interaction between a cell type and a solid biological material in the area covered previously by the bottom edge of said removable partition unit(s).

31. The method of claim 30, further comprises the steps of:

removing the central culturing cylinder from said cell culture container; and

examining interaction among different types of cells in the area delimited previously by said central culturing cylinder.

32. The method of claim 30, further comprises the steps of:

5 contacting a selected region on said cell culture container with the cutting end of a cell sampler, said cell sampler has a cutting end and a sampling end on its opposite ends; and

collecting cells in said selected region with said sampling end of said cell sampler, wherein said sampling end comprise a removable cell sampling surface to which said
10 cells in said selected region will adhere.

33. A method of studying relative migrations between different types of cells under the same conditions, said method comprises the steps of:

culturing different types of cells in the cell culture system of claim 1, wherein
15 said cells are placed in different compartments of said cell culture container;

removing the removable partition unit(s) from said cell co-culture system; and
examining cell migrations towards the area covered previously by the bottom
edge of said removable partition unit(s).

20 34. A method of studying mutual growth impacts of different types of live cells, said method comprises the steps of:

culturing different types of cells in the different compartments of the cell co-culture system of claim 1, wherein said compartments are partitioned by removable partition unit(s), wherein the bottom edge of said partition unit(s) is(are) sawtooth-shaped on one side
25 and is(are) straight on the other side;

removing the removable partition unit(s) from said cell co-culture system; and
monitoring the interacting front lines of cells grown previously in adjacent compartments of said co-culture system.